USER LOCATION RETRIEVAL FOR CONSUMER ELECTRONIC DEVICES

The present invention relates to providing user data to recommender systems of consumer electronic devices and, more particularly, to providing locations of the user's mobile terminal to such systems.

More and more, consumer electronic (CE) devices are able to adapt to personal needs of the user. Recommender systems, which are integrated into CE devices like a television (TV) or a set-top box, afford an exceptional degree of personalization for the devices. The recommender for such devices works as an electronic guide/butler that helps the user to choose or filter programs or content that he/she may like. An example of a system with a recommender is a personal video recorder (PVR) or digital video recorder (DVR) such as the TiVo™ box in which the recommender is used to select for recording TV programs the user may like. The effectiveness of the recommender is, however, highly dependent on input regarding what the user likes or dislikes, e.g., user preferences that may vary with time of day or day of the week. Feeding the recommender system with user data or "user profile data" is a crucial factor in making the system work properly. There exists a need to find and get reliable data that can make the system function more efficiently and can provide the user with a selection of content that the user perceives as valuable (e.g. enjoyable) at a given time.

The present invention has been made to address the above-noted shortcomings in the prior art. It is an object of the invention to furnish to a recommender of a consumer electronic (CE) device information about the past location of a mobile terminal of the user. The recommender may then propose content related to the past location. The present invention is based on the observation that the user's mobile terminal, such as a mobile phone, hand-held global positioning system (GPS) receiver, personal digital assistant (PDA), has evolved into a strictly personal device that the user almost always carries with him and that the mobile phone, for example, is able to retrieve location information on different gradation levels. Broadcasted control information in a mobile terminal network such as a mobile phone network includes data that identifies the country and the base station or base transceiver station (BTS) making the broadcast. It can thus be determined, for example, from the data that the mobile phone was in Spain and within the broadcast coverage area of a BTS in Barcelona. The invention is also based on the observation that the mobile phone can retrieve this information automatically, and can convey it automatically to the recommender by

means of the Bluetooth ad hoc network which is being integrated more and more into mobile and home CE devices.

In brief, the present invention provides user data pertaining to a user of a mobile terminal to a recommender system of a consumer electronic device. The terminal, in one aspect of the invention, determines its current location, saves an identifier of the determined location, and informs the recommender system of the determined location.

In another aspect of the invention, the terminal includes a memory, a transmitter, a receiver configured for receiving a wireless signal, and a processor for determining, from the received signal, a current location of the terminal. The processor also saves an identifier of the determined location to memory and informs the recommender system of the determined location by means of the transmitter.

Details of the invention disclosed herein shall be described with the aid of the figures listed below, wherein the same or similar features are annotated with identical numerals throughout the drawings:

FIG. 1 is a block diagram depicting a mobile phone and a combination CE device/recommender system in accordance with the present invention;

FIG. 2 is a flow chart illustrating the functioning of a preferred embodiment of the present invention; and

FIG. 3 is a flow chart illustrating the functioning of another preferred embodiment of the present invention.

FIG. 1 illustrates, by way of non-limitative example, a mobile phone 104 and a CE/recommender system combination 108 in accordance with the present invention. Although a mobile phone is depicted, any type mobile terminal, e.g. laptop, is envisioned within the intended scope of the present invention. The mobile phone includes a microcontroller 112 having a timer 116. Linked with the microcontroller 112 are a transceiver 120 having a transmitter and a receiver, a Bluetooth device 124, a memory 128, a GPS unit 132, a keypad 136, a microphone 140, a PCS unit 144, a display 148 and a speaker 152. The transceiver 120 communicates wirelessly with a local base transceiver station (BTS) of a mobile phone network (not shown) such as those operating based on code division multiple access (CDMA) or the global system for mobile telecommunications (GSM). The Bluetooth device 124 may include its own transceiver or the transceiver 120 may be adapted to accommodate both Bluetooth frequencies and those of the mobile phone network. Bluetooth is an emerging technology for mobile, wireless communication among two or more

devices that incorporate respective Bluetooth devices, the devices being located within a range of about 10 meters. Increasingly, Bluetooth devices are utilized in mobile phones, for example. The memory 128 preferably includes random access memory (RAM) and may include read-only memory (ROM) in any of their various forms. An optional global positioning system (GPS) unit 132 serves as an alternative means by which the phone 104 can determine its location. The personal communication system (PCS) unit 144 incorporates much of the functionality, such as automatic dialing, that is standard for mobile phones. The keypad 136, display 148, microphone 140 and speaker 152 are all suited for performing their conventional functions. As shown in FIG. 1, an antenna 156 of the phone 104 communicates wirelessly, preferably on a Bluetooth connection, with an antenna 160 of a television (TV) 164 component of the CE/recommender system combination 108 which also includes a recommender system or TiVo™ 168.

FIG. 2 represents one example of how a mobile phone can derive information about its location that can serve as user data for a recommender system in accordance with the present invention. The process begins once the phone 104 determines that it is outside its home territory which is the home area or portion of the mobile phone network that normally services the subscriber. When the user travels outside the home territory, known as "roaming," the phone 104 may still be serviced by the network, subject to pre-existing agreement among providers, but usually at a higher billing rate. The mobile phone typically can detect when it is roaming by comparing a broadcasted code or series of codes to identifying information stored within the phone. As long as there is a match, the phone is in the home network and is not roaming (step 204). These codes identify a region such as a country, and an included sub-region such as the BTS coverage area in which the phone 104 is currently located. The phone, as will be discussed below, derives these codes from the broadcast and selectively saves them to memory 128, the association of labels such as "Spain" and "Barcelona" with the respective codes being a task preferably left by the recommender 168. However, alternatively, the latter function too can be programmed into the phone 104.

When the codes fail to match, the phone is roaming which may be of interest to the recommender 168, but not necessarily. The user may, for example, have traveled merely to an area neighboring his home area that is not of particular interest to the user. In the present embodiment, the decision on whether the area roamed to is of such a nature, e.g. far enough away or in a desired continent, that it would be of interest to the user is made according to

logic within and user data inputted into the recommender 168, although the phone 104 can alternatively be configured to make that decision.

In the current embodiment, a region encountered is ignored if that region has already been saved by the phone 104 for subsequent reporting to the recommender system 168 (steps 208, 212). Alternatively, timing information that relates to the revisiting of a region may be collected for subsequent analysis.

If the current region has not already been saved for subsequent transmission to the recommender 168 (step 212), the length of time for which the phone 104 stays in the current region is determined along with other timing information. More specifically, if the phone 104 stays in the current region or sub-region long enough, the current region or sub-region as appropriate will be retained for reporting to the recommender 168 except that a sub-region is not retained if its respective region is not retained. The latter exception is a preferred, but not a necessary, feature of the invention.

These timings of the current region and sub-region begin by resetting, i.e. starting, the first and second predetermined time periods which respectively correspond to the current region and the current sub-region (step 216). If, for example, the timer 116 is implemented as a real-time clock, resetting a time period amounts merely to noting the current time on the clock and saving that time for subsequent reference. It is within the intended scope of the invention, however, that, alternatively, the timer 116 may include multiple clocks which are dedicated respectively, for example, to specific ones of the current region and what have been regarded at particular times as the current sub-region within that region. If dedicated clocks are used according to this alternative embodiment, resetting a time period may be accomplished by (re)activating the clock.

In addition, the current region and sub-region are stored temporarily while their longevity is being assessed in relation the first and second predetermined time periods respectively. For example, sufficient longevity (i.e., longer than the first predetermined time period) of the user's stay in the current region indicates that the user may find subject matter regarding that region to be of interest, especially in the immediate short term after returning home, where the TV 164 and TiVo™ 168 are located.

Query is next made as to whether the first predetermined time period has expired (steps 220, 224). If so, an identifier of the current region is saved for subsequent transmission to the TV 164, as by Bluetooth when the phone 104 comes within the vicinity of the TV. The identifier may simply be the code from the broadcast signal, i.e. country code,

or, as suggested above regarding an alternative embodiment, it may be a descriptive label obtained from code translating or interpreting such as "Spain." Also saved, in addition, are any sub-regions which have been flagged, as will be discussed in more detail below (step 228). Processing returns to the beginning (step 204).

If, on the other hand, the expired time period is not the first predetermined time period, it is the second predetermined time period. Since the second predetermined time period pertains to the current sub-region, the current sub-region is flagged (step 232). The current sub-region will therefore be saved along with the current region, provided that the first predetermined time period for the current region expires before a new region is entered by the mobile phone 104.

If, on the other hand, it is determined in step 220 that no time period has expired, query is made as to whether the current region has changed (step 236), based on the decoding of the current broadcast signal, or, alternatively, as detected by means of the GPS unit 132. If the current region has changed, the new region is stored (step 240) and any sub-regions of the former region are unflagged (step 244) so that those sub-regions, like their region, will not be reported to the recommender 168. Processing returns to the beginning (step 204).

If the current region has not changed, but the current sub-region has changed (step 248), the current sub-region is temporarily stored for longevity assessment (step 252) and the second predetermined time period is reset (step 256).

If, on the other hand, the current sub-region has not changed either, processing returns to check again if a time period has expired (step 220).

Another preferred embodiment of the present invention, as shown in FIG. 3, differs from the embodiment of FIG. 2 in that the second predetermined time period is not utilized. Instead, sub-regions are timed open-endedly as indicated in step 356. Sub-regions, therefore, need no flagging as an indicator sufficient longevity, as can be seen from step 328. Preferably, the recommender 168 takes care of assessing importance of sub-regions based on their respective timings which are transmitted to the recommender along with the region and sub-region identifiers, as also seen from step 328. Accordingly, only the first predetermined time period, or "region time period," needs to be monitored, as reflected in the respective steps 316, 320.

In the previously depicted two exemplary embodiments, the phone 104 is assumed to denote a location by its current region and current sub-region, although the invention is not limited to two levels of gradation. Multiple levels of gradation are contemplated as within

the intended scope of the invention, e.g. continent, country, state/province, city, suburb, street, home. Accordingly, the gradations can be arranged in a telescoping hierarchy of, e.g., a country as a region, a state within the country as a sub-region, a city within the state as, with respect to the latter sub-region, an included sub-region, etc. Labels and, optionally, timing information, may be collected from monitoring that extends to one or more of the multiple sub-regions based on one or more clocks of the timer 116. Interpretation of the collected data may be performed, in whole or in part, by the phone 104 or may be reserved for the recommender system 168.

Once the user returns home, a Bluetooth connection is automatically and seamlessly made as the user, and therefore his phone 104, comes within the Bluetooth effective range of the other Bluetooth device in the TV 164. The information saved for transmission in the above embodiments is then automatically transferred by means of this connection to the TV 164 and then to the recommender system 168. The recommender 168 may surmise from the region identifier "Spain" and from the sub-region identifier "Barcelona" that the returning traveler might, for example, fancy seeing a documentary on Barcelona/Spain. She might smile and say "I've been there."

As has been demonstrated above, a mobile phone is easily adapted to leverage the existing network infrastructure to automatically, and without user intervention other than to take his or her phone along while traveling and returning home, to feed a recommender system with user data that reliably reflects a topic the user would find of value for practical or entertainment reasons.

While there have been shown and described what are considered to be preferred embodiments of the invention, it will, of course, be understood that various modifications and changes in form or detail could readily be made without departing from the spirit of the invention. For example, the keypad 136 can be configured with a "store location" button actuatable by the user to store the current location instead of, or preferably in addition to, an automatically functioning embodiment as described above. It is therefore intended that the invention be not limited to the exact forms described and illustrated, but should be constructed to cover all modifications that may fall within the scope of the appended claims.